Fu Lin

CONTACT INFORMATION

Mathematics and Computer Science Division
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EDUCATION

Ph.D. in Electrical and Computer Engineering

University of Minnesota, Minneapolis, 2012.

Thesis: Structure identification and optimal design of large-scale networks of dynamical systems.

Advisor: Mihailo R. Jovanović.

B.S. in Instrument Science and Engineering

Shanghai Jiao Tong University, Shanghai, China, 2005.

WORK EXPERIENCE

Postdoctoral Appointee
Argonne National Laboratory, September 2013–present.

Postdoctoral Associate
University of Minnesota, Minneapolis, January–August 2013.

Research Assistant
University of Minnesota, Minneapolis, 2006–2012.

Teaching Assistant
University of Minnesota, Minneapolis, 2005–2008.

Graduate courses: Linear Systems and Optimal Control, Robust Control System Design.

Undergraduate courses: Introduction to Electronic and Electrical Circuits, State-Space Control System Design, State-Space Control Laboratory, Signals and Systems, Linear Control Systems Laboratory, Linear Control Systems: Designed by Input-Output Methods.

RESEARCH INTERESTS

- Sparsity-promoting control and structured design.
- Estimation and control for multi-agent systems.
- Multilevel methods for nonlinear optimization.
- Optimization algorithms for energy systems.

SOFTWARE

1. Sparsity-promoting linear quadratic regulator.
   Matlab-based software for identification and design of sparse feedback gains.
   URL: www.ece.umn.edu/∼mihailo/software/lqrsp
2. Leader selection in stochastically forced consensus networks.
   A Matlab implementation of algorithms for leader selection in consensus networks.
   URL: www.ece.umn.edu/∼mihailo/software/leaders

GOOGLE SCHOLAR

- Publications with citation counts: 610 citations with h-index 12.

Journal papers

1. F. Lin, "Performance of leader-follower multi-agent systems in directed networks," ANL/MCS-P6018-0616, submitted, 2016.
2. F. Lin, S. Leyffer, and T. Munson, "A two-level approach to large mixed-integer programs with application to cogeneration in energy-efficient buildings,", *Computational Optimization and Applications*, DOI:10.1007/s10589-016-9842-0, pages 1–46, 2016.
3. M. Fardad, F. Lin, and M. R. Jovanović, "Design of optimal sparse interconnection graphs for synchronization of oscillator networks," *IEEE Trans. Automat. Control*, vol. 59, no. 9, pages 2457-2462, 2014.
4. F. Lin, M. Fardad, and M. R. Jovanović, "Algorithms for leader selection in stochastically forced consensus networks," *IEEE Trans. Automat. Control*, vol. 59, no. 7, pages 1789-1802, 2014.
5. F. Lin, M. Fardad, and M. R. Jovanović, "Design of optimal sparse feedback gains via the alternating direction method of multipliers," *IEEE Trans. Automat. Control*, vol. 58, no. 9, pages 2426-2431, 2013.
6. F. Lin, M. Fardad, and M. R. Jovanović, "Optimal control of vehicular platoons with nearest neighbor interactions," *IEEE Trans. Automat. Control*, vol. 57, no. 9, pages 2203-2218, 2012.
7. F. Lin, M. Fardad, and M. R. Jovanović, "Augmented Lagrangian approach to design of structured optimal state feedback gains," *IEEE Trans. Automat. Control*, vol. 56, no. 12, pages 2923-2929, 2011.
8. F. Lin and M. R. Jovanović, "Least-squares approximation of structured covariances," *IEEE Trans. Automat. Control*, vol. 54, no. 7, pages 1643-1648, 2009.

Refereed conference papers

1. F. Lin, and J. Chen "Learning Low-Complexity Auto-Regressive Models via Proximal Alternating Minimization," submitted, 2016.
2. F. Lin, Z. Di, and S. Leyffer, "A multiscale approach to a class of semidefinite programs," in *Proceedings of the 2016 American Control Conference*, to appear, 2016.
3. F. Lin and C. Chen, "Optimal load shedding in electric power grids," in *Proceedings of the 2016 American Control Conference*, to appear, 2016.
4. M. Fardad, X. Zhang, F. Lin, M. R. Jovanović, "On the properties of optimal weak links in social networks" in *Proceedings of the 53rd IEEE Conference on Decision and Control*, Los Angeles, CA, pages 2124-2129, 2014.
5. D. M. Zoltowski, N. Dhingra, F. Lin, and M. R. Jovanović, "Sparsity-promoting optimal control of spatially-invariant systems" in *Proceedings of the 2014 American Control Conference*, Portland, OR, pages 1255-1260, 2014.
6. M. Fardad, F. Lin, and M. R. Jovanović, "On optimal link creation for facilitation of consensus in social networks " in *Proceedings of the 2014 American Control Conference*, Portland, OR, pages 3790-3795, 2014.
7. F. Lin, M. R. Jovanović, and T. T. Georgiou, "Algorithms for matrix completion of partially known state covariances" in *Proceedings of the 52nd IEEE Conference on Decision and Control*, Florence, Italy, pages 1684-1689, 2013.
8. M. R. Jovanović and F. Lin, "Sparse quadratic regulator" in *Proceedings of the 12th European Control Conference*, Zurich, Switzerland, pages 1047-1052, 2013.

9. M. Fardad, F. Lin, X. Zhang, and M. R. Jovanović, "On new characterizations of social influence in social networks" in *Proceedings of the 2013 American Control Conference*, Washington, DC, pages 4784-4789, 2013.
10. F. Lin, M. Fardad, and M. R. Jovanović, "Performance of leader-follower consensus algorithms in directed trees and lattices" in *Proceedings of the 51st IEEE Conference on Decision and Control*, Maui, HI, pages 734-739, 2012.
11. M. Fardad, X. Zhang, F. Lin, and M. R. Jovanović, "On the optimal dissemination of information in social networks" in *Proceedings of the 51st IEEE Conference on Decision and Control*, Maui, HI, pages 2539-2544, 2012.
12. F. Lin, M. Fardad, and M. R. Jovanović, "Identification of sparse communication graphs in consensus networks" in *Proceedings of the 50th Annual Allerton Conference on Communication, Control, and Computing*, 2012, **(Invited paper)**.
13. N. Dhingra, F. Lin, M. Fardad, and M. R. Jovanović, "On identifying sparse representations of consensus networks" in *3rd IFAC Workshop on Distributed Estimation and Control in Networked Systems*, Santa Barbara, CA, 2012.
14. F. Lin, M. Fardad, and M. R. Jovanović, "Sparse feedback synthesis via the alternating direction method of multipliers" in *Proceedings of the 2012 American Control Conference*, Montreal, Canada, pages 4765-4770, 2012.
15. M. Fardad, F. Lin, and M. R. Jovanović, "On the optimal synchronization of oscillator networks via sparse interconnection graphs" in *Proceedings of the 2012 American Control Conference*, Montreal, Canada, pages 4777-4782, 2012.
16. F. Lin, M. Fardad, and M. R. Jovanović, "Algorithms for leader selection in large dynamical networks: Noise-corrupted leaders" in *Proceedings of the 50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, pp. 2932-2937, 2011.
17. M. Fardad, F. Lin, and M. R. Jovanović, "Algorithms for leader selection in large dynamical networks: Noise-free leaders" in *Proceedings of the 50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, pp. 7188-7193, 2011.
18. M. Fardad, F. Lin, and M. R. Jovanović, "Sparsity-promoting optimal control for a class of distributed systems" in *Proceedings of the 2011 American Control Conference*, San Francisco, CA, 2011, pp. 2050-2055.
19. F. Lin, M. Fardad, and M. R. Jovanović, "On the optimal localized feedback design for multi-vehicle systems," in *Proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010, pp. 5744-5749.
20. M. Fardad, F. Lin, and M. R. Jovanović, "On the dual decomposition of linear quadratic optimal control problems for vehicular formations," in *Proceedings of the 49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010, pp. 6288-6292.
21. F. Lin, M. Fardad, and M. R. Jovanović, "On the optimal localized feedback design for vehicular platoons," in *Proceedings of the 2010 American Control Conference*, Baltimore, MD, 2010, pp. 4622-4627.
22. M. Fardad, F. Lin, and M. R. Jovanović, "On the optimal design of structured feedback gains for interconnected systems," in *Proceedings of the 48th IEEE Conference on Decision and Control*, Shanghai, China, 2009, pp. 978-983.

23. F. Lin, M. Fardad, and M. R. Jovanović, "Synthesis of H_2 optimal static structured controllers: primal and dual formulations," in *Proceedings of the 47th Annual Allerton Conference on Communication, Control, and Computing*, Monticello, IL, 2009, pp. 340-346, **(Invited paper)**.
24. F. Lin and M. R. Jovanović, "Energy amplification in a parallel Blasius boundary layer flow subject to free-stream turbulence," in *Proceedings of the 2008 American Control Conference*, Seattle, WA, 2008, pp. 3070-3075.
25. F. Lin and M. R. Jovanović, "On the least-squares approximation of structured covariances," in *Proceedings of the 2007 American Control Conference*, New York, NY, 2007, pp. 2648-2653.

Invited talks

1. "Optimal design of large-scale networks of dynamical systems," *Center for Optimization and Statistical Learning*, Northwestern University, Evanston, IL, 2016.
2. "Optimal design of large-scale networks of dynamical systems," *IBM Thomas J. Watson Research Center*, Yorktown Heights, NY, 2016.
3. "Optimal design of large-scale networks of dynamical systems," *School of Engineering*, University of Massachusetts, Boston, MA, 2016.
4. "Optimal design of large-scale networks of dynamical systems," *United Technologies Research Center*, Hartford, CT, 2016.
5. "Optimal design of large-scale networks of dynamical systems," *Electrical and Computer Engineering*, University of Michigan–Dearborn, MI, 2016.
6. "Distributed generation for energy-efficient buildings using optimization method," *Chicago-Area SIAM Student Chapter Forum*, Argonne, IL, 2015.
7. "A multilevel approach to large mixed-integer programs," *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, 2015.
8. "Distributed generation for buildings: A multiscale optimization approach," *INFORMS Annual Meeting 2014*, San Francisco, CA, 2014.
9. "Leader selection in noisy multi-agent systems," *SIAM Annual Meeting*, Chicago, IL, 2014.
10. "Algorithms for leader selection in consensus networks," *Network Security Lab*, University of Washington, Seattle, WA, 2013.

Other talks

1. "A two-level approach to large mixed-integer programs with application to cogeneration in buildings," *Laboratory for Advanced Numerical Simulations Informal Seminar*, Argonne, IL, 2015.
2. "A multilevel approach to a class of semidefinite programs," *22nd International Symposium on Mathematical Programming*, Pittsburgh, PA, 2015.
3. "A two-level approach to large mixed-integer programs with application to cogeneration in buildings," *MACS Webinar*, Argonne, IL, 2015.
4. "Distributed generation for energy-efficient buildings: A mixed-integer multi-period stochastic approach," *SIAM Conference on Optimization*, San Diego, CA, 2014.

5. "Distributed generation for energy-efficient buildings: A mixed-integer multi-period stochastic approach," *Multifaceted Mathematics for Complex Energy Systems Seminar*, Argonne, IL, 2014.
6. "On a combinatorial optimization problem involving the graph Laplacian matrix," *Laboratory for Advanced Numerical Simulations Informal Seminar*, Argonne, IL, 2013.
7. "Leader selection in consensus networks," *Argonne Postdoc Research Symposium*, Argonne, IL, 2013.
8. "Structure identification and optimal design of networks of dynamical systems," *Argonne National Laboratory*, Argonne, IL, 2013.
9. "Sparsity-promoting optimal control of distributed systems," *2012 SIAM Annual Meeting*, Minneapolis, MN, 2012.

Posters

1. "A multilevel approach to class of semidefinite programs," *Argonne Postdoc Symposium 2015*, Argonne, IL, 2015.
2. "Optimal design of distributed generation for energy-efficient buildings," *Argonne Postdoc Symposium 2014*, Argonne, IL, 2014.
3. "Design of optimal sparse feedback gains via the alternating direction method of multipliers," *NSF CMMI Research and Innovation Conference 2012*, Boston, MA, 2012.
4. "Algorithms for design of structured distributed controllers with application to large-scale vehicular formations," *NSF CMMI Research and Innovation Conference 2011*, Atlanta, GA, 2011.

Referee

American Control Conference, Automatica, European Journal of Control , IEEE Conference on Decision and Control, IEEE Multi-conference on Systems and Control, IEEE Transactions on Automatic Control, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Control of Network Systems, IEEE Transactions on Control Systems Technology, IEEE Transactions on Signal Processing, IFAC World Congress, IFAC Conference on Nonlinear Model Predictive Control, Journal of the Franklin Institute, Scientific Reports from Nature Publications, SIAM Journal on Control and Optimization, Springer Research Monograph Series, Systems & Control Letters.

Minisymposium organizer

1. "Optimization algorithms for power grid expansion, transmission, and contingency analysis," *SIAM Conference on Computational Science and Engineering*, Salt Lake City, UT, 2015.
2. "Leader selection in multi-agent systems under disturbances," *SIAM Annual Meeting*, Chicago, IL, 2014.

Conference session chair

1. "Stochastic Optimization I," *SIAM Conference on Optimization*, San Diego, CA, 2014.
2. "Cooperative Control IV," *49th IEEE Conference on Decision and Control*, Atlanta, GA, 2010.

3. "Networked Control Systems II," *51st IEEE Conference on Decision and Control*, Maui, HI, 2012.

MEMBERSHIP

Institute of Electrical and Electronics Engineers, Control Systems Society.

Society for Industrial and Applied Mathematics.

Institute for Operations Research and the Management Sciences.

ADDITIONAL INFORMATION

Permanent resident of the United States.